TEAM LEARNING

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by

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INTRODUCTION

The slow learner is a cause for great concern to educators. He has the capacity to learn, but can not keep up with the rate at which material is presented in the average classroom situation. As he progresses from grade to grade, he learns that he can not achieve the goals that are set for him by our educational system. It is quite possible, therefore, that before he is out of grade school, the slow learner will be alienated by the very educational system that is intended to help him. Thomas Mahen felt that by seventh grade the school has alienated the slow learner.[1] It is conceivable that this hostility toward school may come even at an earlier age.

Lloyd Dunn categorized slow learners as a "marginal group" who have a failure oriented self-concept. He believed that success experiences are very important to these people.[2] The need for success in school by all individuals is one of the reasons why so many attempts have been made to provide

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[1]Thomas W. Mahen, "The Slow Learner: Fact or Excuse?," The School Review, 1965.

[2]Lloyd M. Dunn, "The Slow Learner--An Overview," NEA Journal (October, 1959), 19-21.

different types of student grouping within the school and within the classroom itself. Results of studies of these attempts at grouping are very conflicting.[1] Most of these studies have been done in the area of ability grouping of classes. Very little study of any variety has been done in the area of grouping within the classroom. Thus a question remains as to whether there is a method of classroom organization that will improve the achievement of the slow learner. The purpose of this study was to test the possibility of a slow learner paired with a fast learner as an answer to this question.

I. THE PROBLEM

Statement of the problem. The purpose of this study was to see if pairing a slow learner with a student of average or above average ability would improve the achievement and/or interest of the slow learner in the area of mathematics.

Importance of the study. The elementary school in Prophetstown, Illinois, is a K-8 system with all students attending in the same building. There are two sections of each grade with approximately twenty students per section.

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[1] Marian Pope Franklin, School Organization: Theory and Practice (Chicago: Rand McNally and Company, 1967), p. 424.

Grades six, seven, and eight are departmentalized and have teachers teaching in the area of their college major or minor only. Students are grouped heterogeneously in relation to their general abilities in the area of academic achievement and aptitude, and their personality characteristics. The achievement and aptitude are based on Science Research Associates' achievement test and primary mental abilities test, and also on teacher judgment. The principal and the teachers of the students involved discuss any possible problems that might arise because of the placement of certain individuals in the same homeroom. They then make the adjustments necessary to minimizing those problems. This type of grouping brings together students with a wide range of skills in the area of mathematics. The range in recent years for seventh graders at Prophetstown on the Science Research Associates' achievement test has been about six years. This is similar to the range of ability in mathematics at the seventh grade level nationally which is between six and seven years.[1]

Many solutions to the problems that involve the slow learner in situations such as described in the previous paragraph have been proposed. Ability grouping has probably

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[1] R. H. Beck, W. W. Cook and N. C. Kearney, The Curriculum in the Modern Elementary School (New York: Prentice-Hall, 1953), p. 28.

been the most dominant method researched. The more recent trends have been in the area of the non-graded schools. But, as long as the present structure at the Prophetstown elementary school exists, a method of classroom organization to help the slow learner is needed. It was with this in mind that this study was undertaken.

II. DEFINITION OF TERMS

Slow learner. For purposes of this study, a slow learner is one who, though capable of achieving a moderate degree of academic success, will do so at a slower rate than his classmates, with less than average efficiency.

Remedial mathematics student. For purposes of this study, a remedial student is a sixth, seventh or eighth grader who does not know his addition and multiplication facts well enough to add and multiply whole numbers with any degree of competence.

Fast learner. For purposes of this study, a fast learner is any student who is not classified as a remedial mathematics student or a slow learner.

Classroom organization. Classroom organization refers to the internal structure of a given set of students after the given set has been placed together in a class.

Ability grouping. Ability grouping refers to placing students of approximately the same potential in a given area of study into groups in the same class. Though this is often done on a basis of achievement, it is still called ability grouping.[1]

Ranking test. A ranking test is a computational skills-simple concept test given at the end of each grading period to all sixth, seventh and eighth grade mathematics students in the Prophetstown grade school. It is written by the investigator of this field report. The purposes of the test are to periodically check the students' computational skills, check their knowledge of the concepts that have been presented in the mathematics class and to help the students by determining their areas of weakness. A copy of the ranking test used in this study can be found in the appendix.

Rating scale. A rating scale as used in this study is a scale used to rate five subjects (history, language, mathematics, reading, and science) according to which the student likes best, and also, according to the student's opinion on degree of difficulty. A copy of this rating scale can be found in the appendix.

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[1]Franklin, loc. cit.

III. PROCEDURE

The objectives of this study were to see whether team learning would improve achievement and interest in mathematics by the slow learner. Although it was not stated as an objective, it was hoped that the achievement and interest of the other students in the class would not be negatively affected. The students were not told that they were part of a study.

Research method. The static group comparison method was used to measure achievement improvement.[1] Details of this are given in Chapter III of this study.

A rating scale, given in the fall and again in the spring, was used to measure any change in interest in mathematics. The same method was used to indicate the feeling of the students about the degree of difficulty of mathematics. Details of this scale are also given in Chapter III.

Control group. The seventh grade students of Prophetstown Elementary School of the 1967-68 school year were used as the control group. This class was taught in much the same manner as seventh grade classes had been taught by this writer

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[1] N. L. Gage (ed), Handbook of Research on Teaching (Chicago: Rand McNally and Company, 1963), p. 182.

for the period since the curriculum was updated to modern math in the year 1962-63. Of course there were slight variations in content and method to meet the individual personality of each class, natural or unplanned occurrences which can not be predicted or planned for, and, hopefully, improvements in the skill of the teacher. It is felt, however, that these were not of such a nature as to cause a major difference between any two consecutive years.

Basically, the method of teaching was discussion based on teacher question and pupil response. Activities such as model making and field trips were used when apropos. The work was largely on an individual basis, with the student responsible for his own progress alone.

Experimental group. This group was the 1968-69 seventh graders of Prophetstown Elementary School of whom there were two sections, one of twenty and one of nineteen. The investigator had taught all the students but one during the previous year in mathematics class. The slow learners were identified the first week of school by teacher judgment and the previous year's ranking test score. A cut-off score of seventeen was used in making this decision.

Three remedial mathematics students were left out of the study completely, thus reducing the experimental group to thirty-six. These three students did not know their basic addition and multiplication facts; they covered different

material than was covered by the rest of the class. Because of the individual attention given these three students, the rest of the class did not receive the full attention of the instructor during each class period.

The method of instruction used for the experimental group was the same as that described in the preceding section for the control group. The classroom structure was the only change that was made. A slow learner and a fast learner worked on classroom assignments together. Any work which was started in class and was to be finished outside of class, or any work assigned to be done exclusively outside the class, was shared by the team. Each team determined, each day, who would do what problems.

Similarity of control and experimental groups. No two groups of seventh graders will be exactly alike. Their similarity, even when coming from the same community, is one of degree. This is an uncontrollable factor in a study of this kind. Even so, certain positive statements can be made about the similarity of the two groups.

In this study the history of the students of the control and experimental groups, the tests that were given and the conditions under which they were given, and the regression possibilities involved were all similar. According to Gage, history, testing, and regression are factors which

contribute to a positive internal validity in a study which uses static group comparison.[1]

Appendix A is a table of first grade Science Research Associates Primary Mental Abilities test scores for the students of the control and experimental groups. Since scores were not available for all students, a judgment made by the investigator was placed in the table for each of these students.

The scores in this table are not meant to justify similarity between the control and experimental groups, but to exhibit one possible means of judging the degree of similarity.

Pairing of the students. The idea behind the pairing of students in the experimental group was to give a slow learner a fast learner partner to help him during the class period. The pairing was done in a patterned manner to minimize the spread of mathematical abilities of the students of each team. The teams were determined by matching the scores of slow learners and fast learners on the final ranking test taken in grade six.

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[1] Ibid., p. 178.

Slow Learner Raw Scores	3	4	4	5	6	7	9	10	12	12	12	15	16	16	17
Fast Learner Raw Scores	18	18	18	19	19	19	20	20	22	22	22	24	24	27	27

Each slow learner was paired with the person whose score appears below his in the table. The remaining fast learners were paired with each other, or could work alone if they so preferred.

During the year minor changes had to be made in teams. Personality conflict was the major reason for a change in partners; however some changes were made due to persons of the opposite sex not wishing to work with each other. Nevertheless, in the opinion of the investigator, the most successful team was a boy-girl team. Success in this case was judged on class performance, not final test scores.

Methods of collection of data. The data collected were of two types, a ranking test score and a rating scale. The ranking test was used to gauge achievement, whereas the rating scale was used to judge interest and opinion on difficulty of mathematics. How the data were collected is explained in the next three paragraphs.

In May, 1968, the fourth and final ranking test of the year was given. The tests were returned to the students for their observation, and then returned to the researcher. They were kept on file in the teacher's room.

During the course of the 1968-69 school year, ranking tests were given at the end of each grading period. Each sixth, seventh and eighth grader in subject school took the same test; there was nothing on the test which had not been covered in the sixth grade curriculum. In May, 1969, the final ranking test of the year was given. The test was returned to the students for their observations, and again collected. The results of the ranking test scores of 1968 of the control group and the ranking test scores of 1969 of the experimental group were the bases for achievement analysis. This analysis is presented in Chapter III.

The rating scale was given to all sixth, seventh and eighth graders by the principal in the first week of September, 1968, and again in May, 1969. The impression was given that the principal, for some unexplained reason, wanted the information. In order to minimize the student's realization of a possible correlation between the rating given by him and the subject taught by the researcher, the researcher did not administer the rating scale. The results were given to the researcher in private. These results of the rating scale appear in Chapter III.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter contains a review of the literature that pertains to what has been done in the past to help the slow learner. The emphasis is on the studies that have been done since 1950.

Ability grouping has been the dominate theme in trying to face the problems of individual differences in students. Ability grouping is an attempt to divide students into classes, or within classes, according to their chances of attaining success in a given area of study. More than twenty criteria, either singlely or in combination, have been used as bases for establishing classroom organization.[1]

Ability grouping was introduced as early as 1920 in some Detroit, Michigan, schools. The practice spread and reached its peak in the thirties. Some schools abandoned the practice during the forties and fifties. Since about 1957 the practice has been revived. The National Education Association Research Division found in 1957-58 that 77.5 per cent of the school districts of 2,500 and over in population

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[1]Chester W. Harris (ed.), Encyclopedia of Educational Research (New York: The McMillan Company, 1960), p. 223.

were using some form of ability grouping in the elementary grades and 90.5 per cent in the secondary schools.[1]

Results of research in the area of ability grouping to divide students into classes are very conflicting. About half of the research seems to show significant results favoring ability grouping, and the other half shows significant results which argue against ability grouping.[2] The following conclusions are based on fifty research studies published since 1960.

> Research on the relative merits of different organizational procedures for ability grouping as they affect pupils' achievement was extensive. However, the results were inconclusive and indefinite. Ability grouping tends to succeed when there is modification of materials, objectives, curriculum and teaching methods. Empirical data supporting either a positive or a negative judgment with regard to the merits of ability grouping are almost nonexistent.[3]

Unfortunately, studies of ability grouping in the area of classroom organization have been too limited in scope to show any trend in their results. Grouping within the classroom is most prevalent at the primary level and is used

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[1]Franklin, op. cit., pp. 423-24.

[2]Franklin, loc. cit.

[3]NEA Research Bulletin (Washington, D. C.: Research Division of the National Education Association), XLVI (October, 1968), p. 75.

mainly in the teaching of reading.[1] Following are just a few of the kinds of research which have been done in the area of ability grouping used to divide students into classes and ability grouping used for classroom organization.

In 1957 Rehwoldt and Hamilton analyzed a rather unique study on interage and intergrade grouping in an elementary school. This was probably similar to today's experiments with a nongraded system. They were favorably impressed by the academic achievement of all pupils. They seemed to think that the wide range of ability and age helped all students to learn better than they would if placed in a homogeneous group.[2]

In a study done at a Cactus, Arizona, elementary school in the fifties, the children from three fourth-grade rooms were divided into ability groupings of low, middle and high. Each day the children left their homerooms and went to their respective reading groups. Each one of the three homeroom teachers taught one of the reading groups. One heterogeneously grouped fourth-grade section was used as the control group.

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[1]Celia B. Stendler, "Grouping Practices," Review of Educational Research, XXVI (March, 1961), 21.

[2]Walter Rehwoldt and Warren W. Hamilton, "An Analysis of Some of the Effects of Interage and Intergrade Grouping in an Elementary School," (final chapter of Doctor's dissertation, University of Southern California, January, 1957).

The students in the experimental groups were grouped on the bases of Metropolitan Achievement Test scores (administered in the early fall), Weekly Reader reading scores (administered in the early fall), and teachers' judgments of each child's oral reading ability and phonetic knowledge. Each of the four teachers involved in the experiment picked the group that she preferred to teach.

The results of the study showed greater improvement in general achievement by the students of homogeneously organized high and middle groups than by those students of high and middle abilities in the heterogeneous group. But the low ability students did better in the heterogeneously grouped class. The high ability experimental group had an average growth in achievement of 1.5 years, whereas the high ability students of the control group had an average growth of only 1.2 years. The average growth for the middle ability experimental group was 1.2 years as compared with 0.9 years for the middle ability students of the control group. However, the low ability experimental group had an average growth of only 0.5 years as compared with an average growth of 1.0 years for the low ability students of the heterogeneous control group.[1]

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[1]John B. Barnes, Educational Research for Classroom Teachers (G. P. Putnam's Sons, 1960), pp. 179-203.

Another study conducted in the fifties involved a Mountain City, Arizona, High school social studies class of twenty-four. The class was divided into two similar groups, determined by sex, age, Intelligence Quotient and achievement scores. Each group of twelve was then divided into three subgroups of four. Group One was divided by carefully considering the abilities, personalities and leadership qualities of the twelve students. The students in Group Two divided themselves. John Haefner's "Cooperation Test in American Government" was used at the beginning and at the end of the course to measure the students' growth in both groups in concepts usually taught in American Government courses. Group One increased the median on the test 5.83 points. Group Two raised the median on the same test 2.5 points. All Group One people increased their achievement scores. Some of Group Two did not. According to teacher observations, Group One did a better job of picking committee chairmen.[1] Even though the two groups were similar, carefully organizing one group for study gave the students of that group an advantage over the students in a similar group that was not carefully organized for study.

A quick glance at the findings of four other studies supports the contention that the findings on grouping are not

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[1]Barnes, op. cit., pp. 148-169.

conclusive. In 1959, Durrell grouped pupils according to ability within the classroom for arithmetic instruction and fitted textbooks and materials to the abilities of the groups. Achievement improved significantly in grades five and six. Grade four showed no significant improvement. The improvement in achievement in grades five and six was greater in problem solving than in computation.[1] But in 1961, Harold H. Lerch found no significant difference in achievement between students involved in intraclass grouping and those in non-grouped situations.[2] About a year later, Richard H. Hart compared arithmetic achievement of fifty nongraded school pupils with fifty matched pairs in a graded school. His findings favored the nongraded sample.[3] In 1963, O. L. Davis Jr. and Neal Tracy published a three year study in which the Joplin Plan (ability grouping across grade levels) and random grouping were used on primary grade students. Their findings did not support the desirability of ability grouping.[4]

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[1]Herbert F. Spitzer and Paul C. Burns, "Mathematics in the Elementary School," Review of Educational Research, XXXI (June, 1961), 252.

[2]J. Fred Weaver and E. Glenadine Gibb, "Research on Elementary School Mathematics," The Educational Digest, XXX (January, 1965), 40.

[3]Ibid.

[4]Ibid.

Again in 1963, Banghart and others compared the achievement of children who used programmed fourth grade texts with that of pupils using a conventional text. The students using the programmed text scored significantly ahead of the others in comprehension; there was no significant difference in problem solving.[1] Since each student can work at his own rate, using programmed texts can be thought of as maximum intraclass grouping in which there is one student per group.

In 1967, the School Mathematics Study Group reported on a slow learner project by Herriot, sponsored by The National Science Foundation. Seventh and ninth grade slow learners used School Mathematics Study Group's Introduction to Secondary School Mathematics and Introduction to Algebra. The slow learners were those who ranked between the twenty-fifth and fiftieth percentiles on an achievement test. The control group covered the materials in the school year. During the same school year, the experimental group covered part of the material as if it were part of a two year course. The statistics of the study indicated a greater gain in achievement by the experimental group using School Mathematics Study Group's materials but at a slower pace of instruction.[2]

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[1] J. Fred Weaver and E. Glenadine Gibb, "Mathematics in the Elementary School," Review of Educational Research, XXXIV (June, 1964), 279-280.

[2] Sarah T. Herriot, The Slow Learner Project: The Secondary School "Slow Learner" in Mathematics (Washington, D. C.: School Mathematics Study Group, 1967).

Summary. There does not seem to be any empirical data that support a specific kind of grouping that would be a solution to the problem of the slow learner. However, the literature surveyed by the researcher does give some hints to possible criteria for solutions. It was pointed out in NEA Research Bulletin, published in October, 1968, that modification of materials, objectives, curriculum and teaching methods along with ability grouping might be the answer. Durrell felt that fitting textbooks and materials to the abilities of the students was a successful method of helping the slow learner. The study by Herriot showed that slowing the pace of instruction aided the slow learner. These findings seem to support the feelings of Brueckner, Grossnickle and Reckzeh. In their opinion homogeneous grouping, ability grouping and tracking systems should not be regarded as solutions to the problems involved in providing for individual differences.[1]

The results of the Cactus, Arizona, study showed that the achievement of above average and average ability students was greater when these students were grouped according to ability rather than heterogeneously grouped. But the achievement of students of low ability was greater in the

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[1]Leo J. Bruecker, Foster E. Grossnickle and John Reckzeh, Developing Mathematical Understandings in the Upper Grades (New York: Holt, Rinehart and Winston, 1961), p. 8.

heterogeneously grouped class. Since many slow learners are also students with low ability, it seems that if slow learners are going to receive any help from classroom grouping, it will not be from a structure that has a slow learner working with a slow learner. Since the teacher does not have the time to give a large amount of time each period to each slow learner, it follows that the only source remaining is a fast learner in the class. In fact, one of twenty-four types of classroom grouping that have been suggested is pairing a rapid learner with a slow learner.[1]

It was with these factors in mind and the heterogeneous grouping principle which exists at the Prophetstown Elementary School, that this study was formulated. The plan gave each slow learner a resource person other than the teacher. It also gave him a chance to work the problems which were within his capacity; yet the atmosphere conducive to a broad range of ideas was not lost.

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[1]Weaver, loc. cit.

CHAPTER III

FINDINGS

The findings of this research project were based on the ranking test scores of the control and experimental groups, and on the results of the rating scale. The results of the data that were obtained from the ranking test and the rating scale are presented in this chapter.

Findings of the ranking test. It was decided, with the help of Dr. Richard Brooks of the Drake University Education Department, to figure the quintiles for the control group. The scores of the experimental group were compared with the scores of the control group by inspecting the per cent of scores that fell in the five divisions created by the quintile scores of the control group.

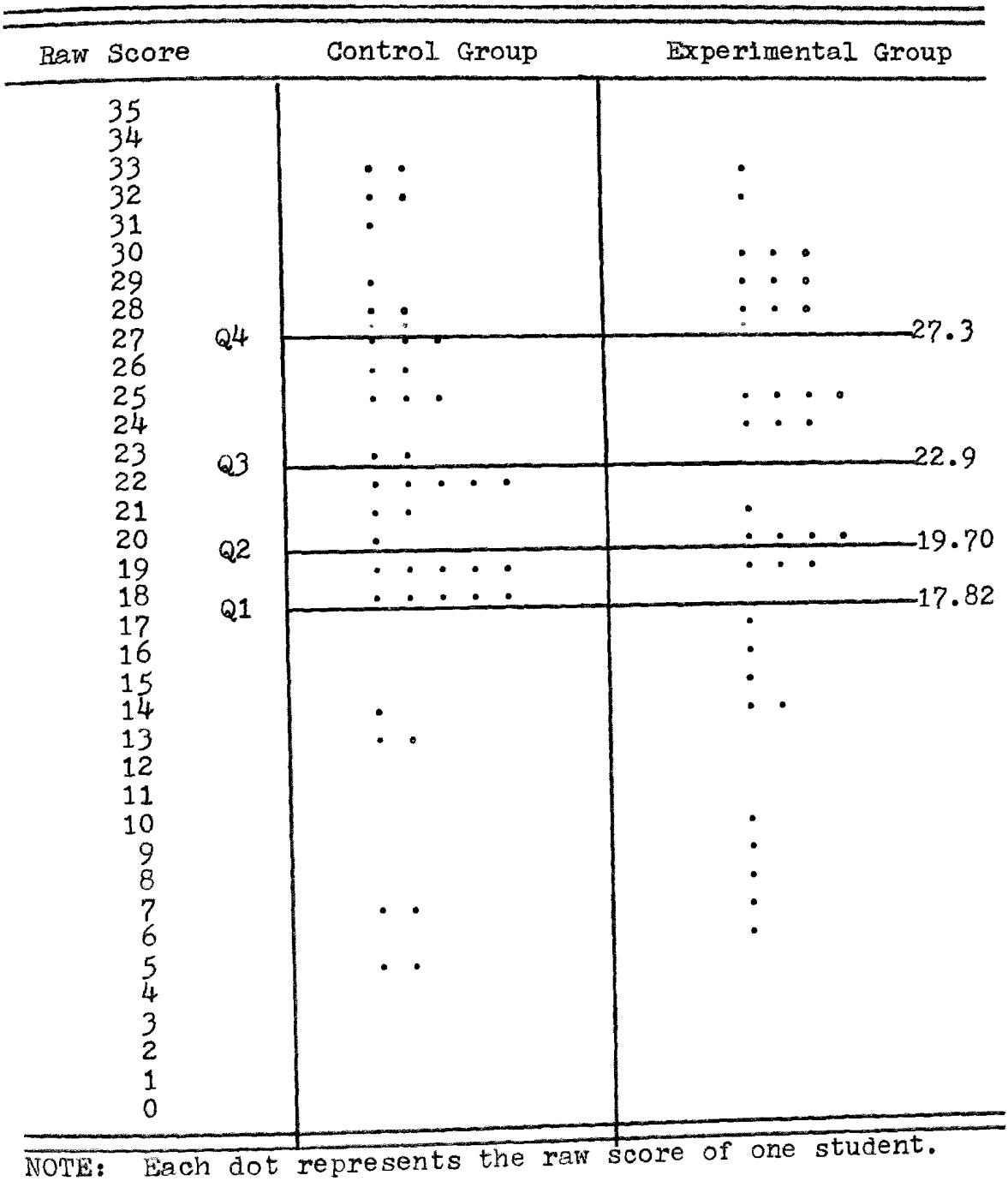
The first quintile had eight per cent more scores than the control group had. The second quintile had twelve per cent fewer scores than the control group had. This is a net result of four per cent fewer students from the experimental group scoring in the lower two quintiles. The upper two quintiles contain fifty per cent of the experimental group's scores. This means that one half of the experimental group scored above a point that forty per cent of the control group scored. The middle three quintiles contained forty-one per cent of the scores of the experimental group, compared with

sixty per cent of the scores of the control group. These results are shown in Figure 1.

	Q1	Q2	Q3	Q4
	17.82	19.70	22.90	27.30
Control Group	20%	20%	20%	20%	20%
Experimental Group	28%	8%	14%	19%	31%

Figure 1. Per cent of experimental group's raw scores falling into control group's raw score quintiles.

It is one thing to show that a group of scores was in a certain range, but quite another to show where in that range they were. Figure 2 shows the relationship between the raw scores of the control group and the raw scores of the experimental group. The range in the first quintile was from five to fourteen for the control group and from six to seventeen for the experimental group. The range in the second quintile was from eighteen to nineteen for the control group while all experimental group scores were nineteen. In the third quintile the range for the control group was from twenty to twenty-two and the range for the experimental group was from twenty to twenty-one. The range in the fourth quintile was twenty-three to twenty-seven for the control group and twenty-four to twenty-five for the experimental group. The range in the fifth quintile was from twenty-eight to thirty-



NOTE: Each dot represents the raw score of one student.

Figure 2. Raw score frequency distribution in relationship to quintiles.

three for both groups. Since every score of the experimental group was greater than the lowest two scores of the control group, all fourteen slow learners of the experimental group scored higher than the two persons with the lowest scores of the control group.

This is all that will be said at this time about the findings on achievement. Conclusions based on these findings are in Chapter IV. The next section gives the findings of the rating scale.

Findings of the rating scale. The rating scale was divided into two distinct parts. The students were asked to rate five subjects (history, language, mathematics, reading, and science) in order from their favorite to the one liked the least. In the second part they were asked to rate the same five subjects in order of difficulty, rating the least difficult first and the most difficult last. These ratings were made by the students in the fall and in the spring. Because the study was designed after the control group had finished seventh grade, it was impossible for the members of the control group to fill out the rating scale as seventh graders. However, it was felt by the researcher that any change in attitudes by the experimental group between the fall and the spring could be compared with any changes in these same attitudes that were made by the students of the researcher's

other classes. It was for this reason that the eighth and sixth graders also filled out the rating scale.

In constructing the tables, the researcher gave the following values to the respective ratings: favorite (4), second (3), third (2), fourth (1), least liked (0), least difficult (4), second (3), third (2), fourth (1), and the most difficult (0). These values were used in determining an interest mean and a mean for difficulty.

Table I has the interest mean for grades six, seven and eight. Interest in mathematics by the seventh graders did not show any significant gain. The increase in the mean for the eighth grade was twelve hundredths. In order to keep the rating scale as honest as possible, the students did not put their names on their papers. It is therefore impossible to tell which students changed what ratings and by how much. The most that can be said, therefore, is that an average of one in every eight persons raised his interest rating by one point. This interpretation is based on the mathematical fact that to raise a mean twelve hundredths, it is necessary to add about one to the dividend for every eight in the divisor. The increase in the mean for the sixth grade was twenty-nine hundredths. Again, the most that can be said is that an average of about one in every three persons raised his interest rating by one point.

TABLE I

MEAN FOR INTEREST RATING GIVEN IN THE FALL AND IN THE SPRING BY SIXTH, SEVENTH AND EIGHT GRADERS OF PROPHETSTOWN ELEMENTARY SCHOOL

	Grade	Fall	Spring
Experimental Group	8	1.63	1.75
	7	0.88	0.90
	6	1.15	1.44

Table II is a breakdown of interest rating by per cents. As was indicated by the mean for interest, the major change in interest seems to be in the sixth grade. Thirteen per cent more persons chose mathematics as their favorite subject in the spring than chose it as their favorite in the fall in the sixth grade. Fifth place received two per cent more ratings and second place received one per cent fewer ratings. The shift came from third and fourth place ratings, which received eight and six per cent fewer ratings respectively.

In the seventh grade, first place received six per cent more ratings, fourth place remained unchanged, and fifth place received three per cent more ratings. Second place and third place received two and seven per cent fewer ratings respectively. These figures represent a net loss of three per cent

of the persons who rated mathematics as first, second, or third in the fall.

In the eighth grade the change in ratings from the fall to the spring was similar to the sixth grade. First, second, third and fifth places gained one per cent, six per cent, one per cent and two per cent respectively. Fourth place had ten per cent fewer ratings in the spring than it did in the fall.

TABLE II

FIVE LEVELS OF RATING INTEREST IN MATHEMATICS WITH THE PER CENT OF STUDENTS GIVING EACH RATING, WITH A RATING OF ONE BEING FAVORITE

	First	Second	Third	Fourth	Fifth	
Grade	17	12	15	29	27	Fall
Eight	18	18	16	19	29	Spring
Grade	2	10	20	10	58	Fall
Seven	8	8	13	10	61	Spring
Grade	5	7	24	27	37	Fall
Six	18	6	16	21	39	Spring

The second part of the rating scale was a degree of difficulty rating. Four points were given to a rating of least difficult. Table III has the mean for difficulty for each grade level. The mean increased by thirty-two hundredths from the fall to the spring for the eighth grade. Just as was

the case with the mean for interest, the most that can be said is that in the spring about one out of every three eighth graders felt that mathematics was less difficult than he had thought in the fall. Both the seventh and sixth grade classes indicated in the spring a feeling that mathematics was more difficult than had been thought in the fall. Again, a decrease of fifty-five hundredths in the mean for the seventh grade indicates that one-half of the seventh graders could have felt this way. Also, a decrease of thirty-one hundredths in the mean for the sixth grade indicates that one-third of the sixth graders could have felt this way. However, if the interpretations of one-half and one-third are correct, the change by each of these people would be only a rating of one place.

TABLE III

MEAN FOR DIFFICULTY RATING GIVEN IN THE FALL AND IN THE SPRING BY SIXTH, SEVENTH AND EIGHTH GRADERS OF PROPHETSTOWN ELEMENTARY SCHOOL

Grade	Fall	Spring
8	1.31	1.63
7	1.29	0.74
6	1.29	0.98

Table IV is a breakdown of difficulty ratings by per cents. The increase in the per cent of persons who chose first, second, and third was one per cent, four per cent, and ten per cent respectively for the eighth grade class. Fourth and fifth place choices decreased by two per cent and thirteen per cent respectively for the eighth grade class. The pattern for the seventh grade was in the reverse of this. First, second and third places decreased by five per cent, four per cent, and fourteen per cent respectively. The per cent of people who chose fourth and fifth places, the two places that indicate the greatest degree of difficulty, was increased by five per cent and eighteen per cent respectively.

In the sixth grade first place choices decreased by three per cent, second place choices remained the same, third place choices decreased by eight per cent, fourth place choices decreased by one per cent, and fifth place choices increased by twelve per cent.

The sixth grade showed the greatest gain in interest in mathematics from the fall to the spring. They also indicated the greatest change in their feelings toward the difficulty of mathematics; as one might <u>not</u> suspect, this change was toward a feeling of greater difficulty.

TABLE IV

FIVE LEVELS OF RATING DIFFICULTY IN MATHEMATICS WITH THE PER CENT OF STUDENTS GIVING EACH RATING, WITH A RATING OF ONE FOR LEAST DIFFICULT

	First	Second	Third	Fourth	Fifth	
Grade Eight	17	10	6	21	46	Fall
	18	14	16	19	33	Spring
Grade Seven	15	7	17	15	46	Fall
	10	3	3	20	64	Spring
Grade Six	8	14	15	24	39	Fall
	5	14	7	23	51	Spring

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to see if pairing a slow learner with a student of average or above average ability would improve the achievement and/or the interest of the slow learner in the area of mathematics. This chapter contains a brief review of how this was accomplished, conclusions of the researcher based on the data that were presented in Chapter III, and recommendations of further study.

Summary. The static group comparison method was used to measure achievement improvement. The seventh grade students of Prophetstown Elementary School of the 1967-68 school year were used as the control group, being taught in what would be considered by most educators to be a traditional method of instruction. The experimental group was the 1968-69 seventh graders of Prophetstown Elementary School. The method of instruction for this group was the same as that used with the control group; however, the experimental group used a different method of classroom organization. A slow learner and a fast learner constituted a learning team within the classroom. Any work that was started in class and was to be finished outside of class, or any work assigned to be done exclusively outside the class, was shared by the team. The experiment lasted the whole school year.

The results of the ranking test that was given to the control group in May, 1968, were compared with the results of the ranking test that was given to the experimental group in May, 1969. The raw scores of the control group were divided into quintiles. The raw scores of the experimental group were compared with the raw scores of the control group by inspecting the per cent of experimental group scores that were in the quintiles determined by the control group scores. By definition, the control group had twenty per cent of the scores in each quintile. The scores of the experimental group were distributed in the following manner: twenty-eight per cent in the first quintile, eight per cent in the second quintile, fourteen per cent in the third quintile, nineteen per cent in the fourth quintile, and thirty-one per cent in the fifth quintile.

A rating scale was given to all sixth, seventh, and eighth graders of Prophetstown Elementary School to determine the feelings of the students towards interest in mathematics and opinions on the difficulty of mathematics. The students were asked to list five subject areas (history, language, mathematics, reading, and science) in order from their favorite to the one liked the least, and to rate the same five subject areas in order from the least difficult to the most difficult. Values that ranged from four to zero were given to the ratings of favorite to least liked and least

difficult to most difficult respectively. These values were used to compute a mean for the interest ratings and a mean for the difficulty ratings. The rating scale was given in the fall and in the spring. The means for interest ratings were as follows: grade eight (1.63 in the fall and 1.75 in the spring), grade seven (0.88 in the fall and 0.90 in the spring), and grade six (1.15 in the fall and 1.44 in the spring). The means for difficulty ratings were as follows: grade eight (1.31 in the fall and 1.63 in the spring), grade seven (1.29 in the fall and 0.74 in the spring), and grade six (1.29 in the fall and 0.98 in the spring).

Conclusions. One of the questions that was to be answered by this study is related to achievement. Can pairing a slow learner with a fast learner improve the achievement of the slow learner? The results of this study indicate that it is doubtful that team learning was of any significant consequence in its effects on the achievement of the slow learner. Thirty-nine per cent of the experimental group were slow learners. Although there is no way of knowing for sure, if approximately the same ratio was true for the control group one would expect to find all the slow learners' scores below nineteen and seventy hundredths (the second quintile). Only thirty-six per cent of the experimental group scores on the ranking test were below nineteen and seventy hundredths as compared with forty per cent of the control group scores.

This fact in itself indicates that some improvement in achievement was made by three per cent of the experimental group who were slow learners. However, twenty-eight per cent of the scores of the experimental group were in the first quintile. The control group had only twenty per cent of its scores in the first quintile.

The fast learners did seem to benefit from the team learning. Fifty per cent of the scores on the ranking test for the experimental group were above twenty-two and ninety hundredths as compared with only forty per cent of the control group scores. Verification that these scores belonged to fast learners was made by checking the names on the test papers.

It appears that interest in mathematics was not increased in the experimental group. The mean for rating subjects from favorite to least liked did not show any significant increase. The opinions on the difficulty of mathematics showed a significant decrease in the mean; it changed from one and twenty-nine hundredths in the fall to seventy-four hundredths in the spring. The reader is reminded that a mean of four would indicate that mathematics is the least difficult subject and a mean of zero would indicate that mathematics is the most difficult subject. Therefore, the decrease in the mean indicates an increase in the number of persons who chose mathematics as the most difficult subject.

This was exactly what happened. In the fall forty-six per cent of the students in the experimental group felt that mathematics was the most difficult subject. In the spring this ratio had risen to sixty-four per cent.

Two of the slow learners raised their scores on the ranking test, which has a perfect score of thirty-five, from nine and ten in May, 1968, to twenty and twenty-four in May, 1969. In the opinion of the investigator, this factor indicates that team learning is a possible means of grouping within the classroom. However, it should be used as only one of many methods of grouping, and used only with those students who seem to benefit by it. This opinion is consistent with the findings of the related literature.

Recommendations. One method of comparing achievement scores would be to compare the mean gain from seventh to eighth grade on the ranking test for the experimental group with the mean gain from seventh to eighth grade on the ranking test for the control group. If this were done, it would be necessary to have the experimental group be involved in team learning during the 1969-70 school year.

This study, like so many studies, seems to indicate that there is no one method of intraclass grouping that works for all students. A comprehensive study, in which as many factors as possible are used, should be attempted. This

study should include the various types of grouping, the different materials and media that are available, and the characteristics of the individual learners involved in the study.

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APPENDIXES

APPENDIX A

Grade One Science Research Associates Primary Mental Abilities Scores and Judgments Where Scores Were Unavailable

1967-68 Seventh Graders	1968-69 Seventh Graders
	133
127	
126	126
125	
124, 124	124
* AA, AA	AA, AA
123, 123	123
122	122, 122
120, 120	120
119, 119	119
118	118
117, 117, 117	117
* HA, HA	
116	116, 116
115	115, 115
	114, 114, 114
113	113
	112
111, 111	111, 111, 111
110	
* A, A, A, A, A	109
108	
107	107
106	106, 106
	105, 105, 105
* LA, LA	LA
104	104
103	
101	101, 101
99	98
*BA, BA	

* AA-Above average. HA-High Average. A-Average. LA-Low average. BA-Below average.

APPENDIX B

Rating Scale

Rank the following subject areas from your favorite to the one least liked by you.

History--Language--Mathematics--Reading--Science

1. _____
2. _____
3. _____
4. _____
5. _____

List the same five subject areas from <u>least</u> difficult to <u>most</u> difficult for you. List the <u>least</u> difficult first.

1. _____
2. _____
3. _____
4. _____
5. _____

APPENDIX C

May, 1968 Ranking Test

Name _____

1. 5283 + 427 + 6000 + 2761 =
2. 17,492 - 12,598 =
3. 437 • 569 =
4. 34,128 ÷ 79 =
5. (4.37) • (20.4) =
6. (17.68) - (8.935) =
7. (4.2) + (0.42) + (42) =
8. (0.0858) ÷ (1.3) =
9. 1 3/4 + 2 7/8 =
10. 1 3/4 • 1 5/7 =
11. 12 1/8 - 2 1/16 =
12. 13 - 4 3/8 =
13. 1/5 + 3/4 + 5/6 + 1/14 =
14. 400 • 3 1/2 =
15. 1 1/3 ÷ 2 1/2 =
16. (0.5 ÷ 1/4 =
17. 3^3 ÷ 4 =
18. $10^2 \cdot 10^3 \cdot 10^5$ =
19. $10^2 + 10^2 + 10^2$ =
20. 10% is equivalent to what fraction? _____
21. 1/2% is equivalent to what decimal? _____
22. 25% of $48 =

23. $\frac{4 \cdot 12 \cdot 13}{8 \cdot 6} =$

24. The reciprocal of 1 1/2 is _____.

25. The opposite of 2/3 is _____.

26. The point $(^{-}2,4)$ is in the _____ quadrant.

27. $(2/3)^3 =$

28. The perimeter of an equilateral triangle of edge "y" is _____.

29. The area of a rectangle of edges "m" and "n" is _____.

30. 50% of 22 is _____.

31. $\frac{14 \cdot 18 \cdot 25 \cdot 400}{9 \cdot 7 \cdot 500} =$

32. $(0.5) \cdot (0.2)^2 =$

33. $10^4 \cdot 10^5 =$

34. What is the reciprocal of the reciprocal of 5? _____.

35. Pick a whole number. Double it. Add 4. Divide by 2. Subtract the number you started with. What do you have now? _____.

APPENDIX D

May, 1969 Ranking Test

Name _____

1. 5283 + 427 + 6000 + 2761 =
2. 17,492 - 12,598 =
3. 437 · 729 =
4. 34,128 ÷ 79 =
5. (5.38) · (30.6) =
6. (22.75) - (8.937) =
7. (8.4) + (0.84) + (84) =
8. (0.0858) ÷ (1.3) =
9. 1 1/4 + 5 7/8 =
10. 2 1/8 · 1 1/17=
11. 14 1/6 - 2 5/12 =
12. 16 - 5 7/11 =
13. 1/5 + 3/4 + 5/6 + 1/14 =
14. 600 · 4 1/2 =
15. 2 1/3 ÷ 1 5/9 =
16. (0.8) ÷ 1/2 =
17. 4^3 ÷ 5 =
18. $10^4 \cdot 10^7 \cdot 10^8$ =
19. $10^2 + 10^2 + 10^2$ =
20. 20% is equivalent to what fraction? _____
21. 1/2% is equivalent to what decimal? _____
22. 25% of $24 =

23. $\frac{8 \cdot 20 \cdot 13 \cdot 9}{16 \cdot 10 \cdot 3} =$

24. The reciprocal of 1 3/4 is _____.

25. The opposite of 1/2 is _____.

26. The point $(^{-}4, ^{-}6)$ is in the _____ quadrant.

27. $(3/4)^3$ = _____.

28. The perimeter of an equilateral triangle of edge "y" is _____.

29. The area of a rectangle with edges "a" and "b" is _____.

30. 50% of 80 is _____.

31. $\frac{14 \cdot 18 \cdot 25 \cdot 400}{9 \cdot 7 \cdot 500} =$

32. $(0.7) \cdot (0.3)^2$ = _____.

33. $10^2 \cdot 10^3$ = _____.

34. What is the reciprocal of the reciprocal of 11? _____.

35. Pick a whole number. Double it. Add 4. Divide by 2. Subtract the number you started with. What do you have now? _____.